
## Transformer Monitoring System

# KONČAR TMS


KONČAR
Electrical Engineering
INSTITUTE

# TMS

## Overview

Transformers are one of the key and most valuable components in a power system. Equipping them with an on-line monitoring system is essential for information gathering, condition assessment, better management and decision making.

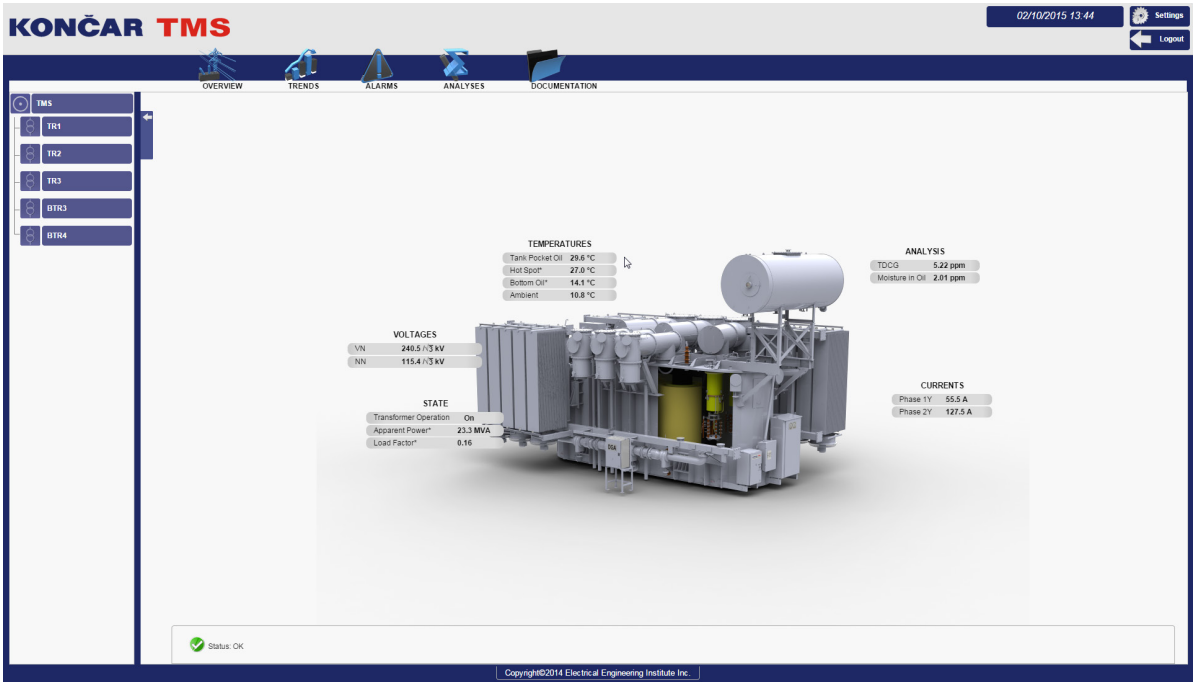
Decades of experience in transformer design, production and on-site diagnostics as well as a field-proven hardware platform are built into Končar TMS – a state-of-the-art monitoring and diagnostic system.

## Benefits

- Detects incipient faults and assists in preventing failures and unplanned outages
- Enables the condition based maintenance
- Improves staff safety and environmental protection
- Provides valuable data for a root cause analysis and an investigation in case of a failure event
- Helps in optimizing transformer performance and enables better asset management (overloading, lifetime expectancy estimations)
- Makes your transformer ready for the 'Smart Grid'

## Features

- Comprehensive on-line monitoring system for all types of power transformers and shunt reactors
- Modular and expandable system for a new or an existing transformer (retrofitting), open to any transformer manufacturer
- Provides monitoring and diagnostic for all vital transformer parts by integrating the available sensors and supporting various IED communication protocols
- Built-in models for transformer condition assessment (bushings, thermal model, insulation ageing, cooling efficiency, OLTC)
- Advanced trending analysis tools
- Interpretation methods of fault gas analysis according to the relevant IEC and IEEE standards
- User defined alarm limit and gradient setting
- Long term archival of data and event logging
- Periodic automatic report generation
- Various remote access options

## Monitoring functions

Due to modularity any of the following functions may be included in the system:

### Bushings
- Operating voltages
- Overvoltages
- Change of bushing capacitance
- Tan delta /power factor
- Loading current (single or three phase)

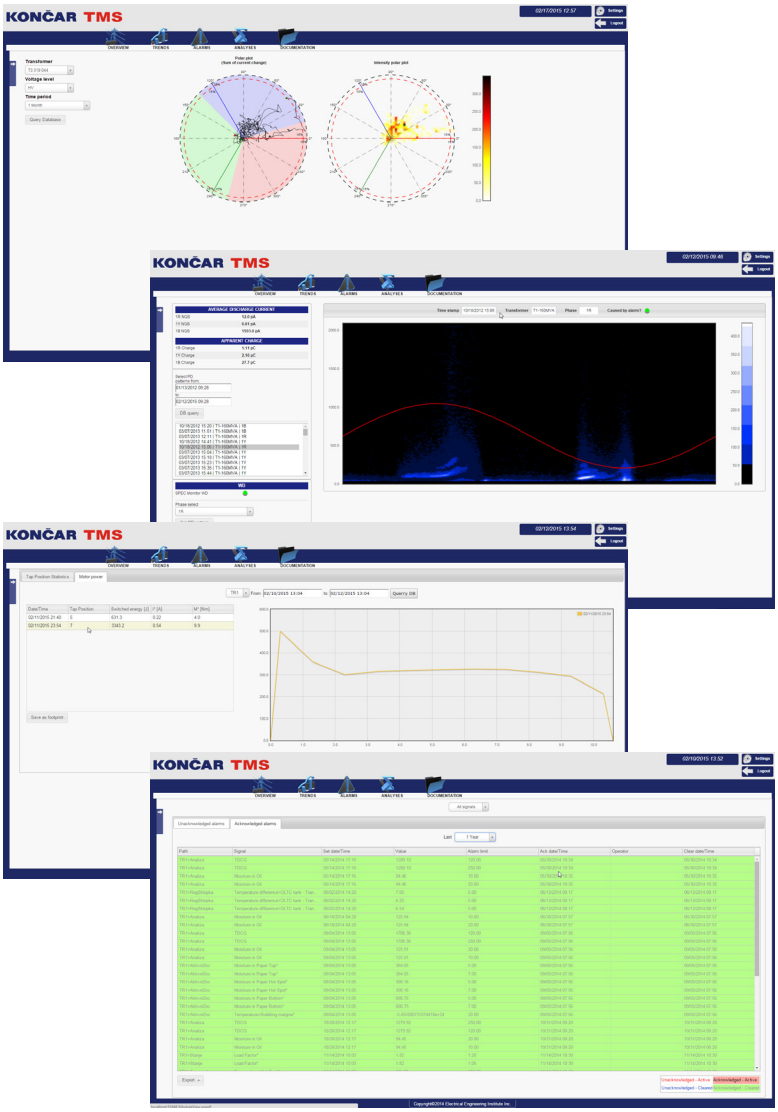
### Active part
- Power (apparent, active, reactive)
- Losses
- Oil temperature (top, bottom)
- Ambient temperature
- Hot-spot temperature (calculation or fiber optic measurement)
- Gas in oil (single or multi gas sensors)
- Moisture in oil and paper
- Paper insulation ageing and lifetime

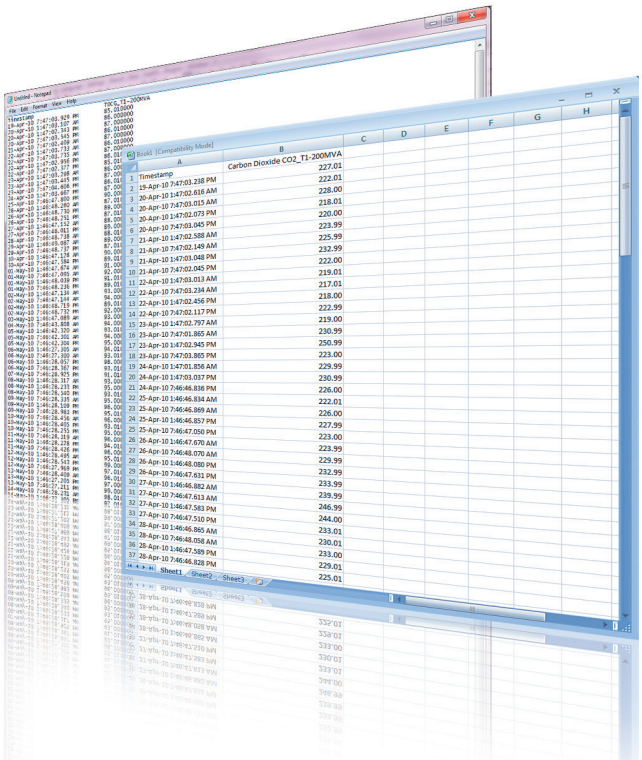
### Partial discharges
- Electrical, acoustic and UHF methods available

### On-Load Tap Changer
- Tap position
- Number of switching operations
- Switching time
- Power consumption of the OLTC motor drive
- OLTC oil temperature and differential
- Sum of switched current
- Contact wear

### Cooling system
- Oil temperatures at the cooler inlets and outlets
- Cooling efficiency
- Running hours of pumps and fans
- Content of gas in the Buchholz relay
- Oil level in the conservator
- Intelligent cooling control
- Auxiliary equipment statuses and alarms (pressure relief device, OTI, WTI, Buchholz relay, etc.)

### Tools
- Trend analysis
- Alarms and events logging
- Loading forecast
- Data export to text and Microsoft Excel
- Automatic report generation

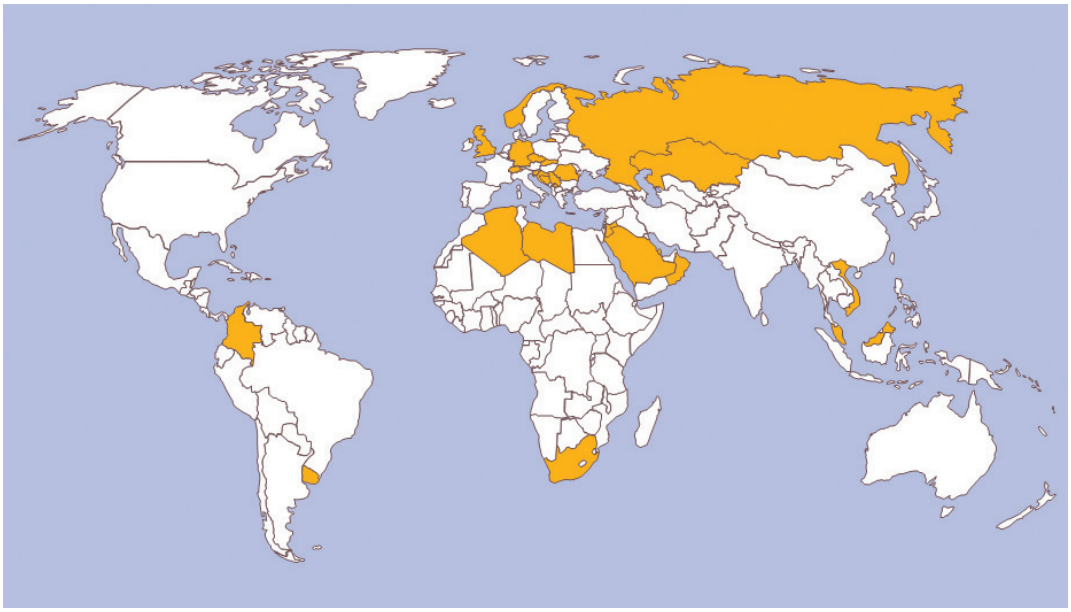


| Monitoring system specification | |
|---|---|
| **Architecture** | Data acquisition unit with the real-time controller installed on the transformer and Industrial PC installed in the control/telecom room |
| **Inputs and outputs** | DC analog inputs: 4-20 mA; 0-10 V DC<br>AC analog inputs (CT): 0-1/5 A<br>RTD inputs: Pt-100<br>Digital inputs: dry contacts with 24V wetting<br>Analog outputs: 4-20 mA<br>Digital outputs: potential free contacts (SPDT relays)<br>Quantity: as per requirement<br>All channels protected from overvoltages and overcurrents |
| **Data logging** | SQL database used for long-term data, alarms and events archival<br>Event driven data acquisition results in a reduced database size |
| **Data visualization** | Web browser or client application for local and remote access |
| **Communication** | Physical layer: RS-232, Ethernet 10/100, Fiber optic |
| **Supported protocols** | IEC 61850; IEC 60870-5-101 and 104; Modbus; OPC |
| **Power supply** | Universal switching power supply<br>Voltage: 85 V AC - 264 V AC, single phase Frequency: 45 – 65 Hz |
| **Cabinet** | Material: Painted stainless steel (color selection per RAL scale)<br>Rating: IP54 (standard), IP66 (on request)<br>Mounting: on a tank wall or a stand |
| **Operating temperature** | -40 to +60°C |
| **Standards compliance** | EMC Directive 2004/108/EC and standards:<br>EN 61000-6-2:2005; EN 61000-6-4:2007; EN 61000-3-2:2006; EN 61000-3-3:2008<br>LVD Directive 2006/95/EC and standards:<br>EN 60950-1:2006+A11:2009 CE |

## Services

- Consulting services on how to select the optimal condition monitoring system for a new or an old transformer
- Installation and commissioning
- Staff training
- Recommendation of limit values (alarms) settings
- Expertise in interpretation of the acquired monitoring results



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ISO 14001:2004 NR.00261/0
ISO 9001:2008 NR.01095/0
OHSAS 18001:2007 NR.00242/0